



## CLN5 gene

ceroid-lipofuscinosis, neuronal 5

### Normal Function

The *CLN5* gene provides instructions for making a protein whose function is not well understood. Cells produce a CLN5 protein that is inactive and contains extra protein segments. This inactive protein is called a preprotein. For the CLN5 preprotein to become active, the additional segments must be removed, followed by additional processing steps. The active CLN5 protein is then transported to cell compartments called lysosomes, which digest and recycle different types of molecules. Research suggests that the CLN5 protein may play a role in the process by which lysosomes break down or recycle damaged or unneeded proteins within cells.

### Health Conditions Related to Genetic Changes

#### CLN5 disease

At least 35 mutations in the *CLN5* gene have been found to cause CLN5 disease. This condition impairs mental and motor development causing difficulty with walking and intellectual function. In addition, affected children often develop recurrent seizures (epilepsy) and vision loss. Signs and symptoms of CLN5 disease typically appear around age 5 but can begin in adolescence or adulthood.

Most of the mutations that cause CLN5 disease make changes in the CLN5 protein that interfere with the processing of the preprotein or alter the structure of the protein. The resulting proteins cannot be transported to the lysosomes. Other mutations lead to production of abnormal proteins that are quickly broken down. One such mutation, known as Fin<sub>major</sub>, is responsible for almost all cases of CLN5 disease in people of Finnish descent. The Fin<sub>major</sub> mutation replaces the protein building block (amino acid) tyrosine with a signal to stop protein production prematurely (written as Tyr392Ter or Y392X).

A lack of functional CLN5 protein within lysosomes probably impairs the breakdown of certain proteins, which then likely accumulate in cells throughout the body. While these accumulations can damage any cells, nerve cells appear to be particularly vulnerable. Widespread loss of nerve cells in CLN5 disease leads to severe signs and symptoms and early death.

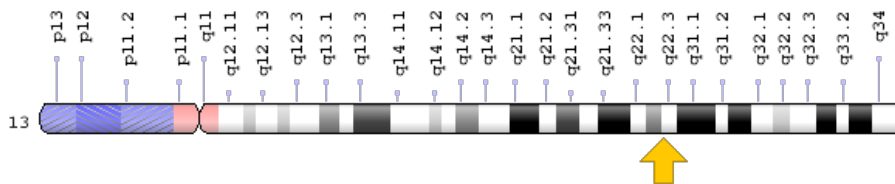
In the cases in which CLN5 disease develops in adolescence or adulthood, it is thought that the *CLN5* gene mutations lead to a CLN5 protein with reduced function that is broken down earlier than normal. Because the altered CLN5 protein can

function for a small amount of time, some damaged or unneeded proteins may be broken down in lysosomes. Since it takes longer for these substances to accumulate and cause nerve cell death, the signs and symptoms of CLN5 disease in these individuals occur later in life.

## Chromosomal Location

Cytogenetic Location: 13q22.3, which is the long (q) arm of chromosome 13 at position 22.3

Molecular Location: base pairs 76,991,924 to 77,002,517 on chromosome 13 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

## Other Names for This Gene

- ceroid-lipofuscinosis neuronal protein 5
- CLN5\_HUMAN

## Additional Information & Resources

### Educational Resources

- Jasper's Basic Mechanisms of the Epilepsies (fourth edition, 2012): Neuronal Ceroid Lipofuscinoses  
<https://www.ncbi.nlm.nih.gov/books/NBK98154/#lehesjoki.s8>

### GeneReviews

- Neuronal Ceroid-Lipofuscinoses  
<https://www.ncbi.nlm.nih.gov/books/NBK1428>

### Scientific Articles on PubMed

- PubMed  
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28CLN5%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5BIa%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D>

## OMIM

- CLN5 GENE  
<http://omim.org/entry/608102>

## Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology  
[http://atlasgeneticsoncology.org/Genes/GC\\_CLN5.html](http://atlasgeneticsoncology.org/Genes/GC_CLN5.html)
- ClinVar  
<https://www.ncbi.nlm.nih.gov/clinvar?term=CLN5%5Bgene%5D>
- HGNC Gene Symbol Report  
[http://www.genenames.org/cgi-bin/gene\\_symbol\\_report?q=data/hgnc\\_data.php&hgnc\\_id=2076](http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=2076)
- NCBI Gene  
<https://www.ncbi.nlm.nih.gov/gene/1203>
- UniProt  
<http://www.uniprot.org/uniprot/O75503>
- University College London: CLN5 Gene Mutation Database  
<http://www.ucl.ac.uk/ncl/CLN5mutationtable.htm>

## **Sources for This Summary**

- OMIM: CLN5 GENE  
<http://omim.org/entry/608102>
- De Silva B, Adams J, Lee SY. Proteolytic processing of the neuronal ceroid lipofuscinosis related lysosomal protein CLN5. *Exp Cell Res*. 2015 Oct 15;338(1):45-53. doi: 10.1016/j.yexcr.2015.08.021.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/26342652>  
*Free article on PubMed Central:* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4589533/>
- Kollmann K, Uusi-Rauva K, Scifo E, Tyynelä J, Jalanko A, Bräulke T. Cell biology and function of neuronal ceroid lipofuscinosis-related proteins. *Biochim Biophys Acta*. 2013 Nov;1832(11):1866-81. doi: 10.1016/j.bbadis.2013.01.019. Epub 2013 Feb 9. Review.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/23402926>
- Larkin H, Ribeiro MG, Lavoie C. Topology and membrane anchoring of the lysosomal storage disease-related protein CLN5. *Hum Mutat*. 2013 Dec;34(12):1688-97. doi: 10.1002/humu.22443.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/24038957>
- Schmiedt ML, Bessa C, Heine C, Ribeiro MG, Jalanko A, Kyttälä A. The neuronal ceroid lipofuscinosis protein CLN5: new insights into cellular maturation, transport, and consequences of mutations. *Hum Mutat*. 2010 Mar;31(3):356-65. doi: 10.1002/humu.21195.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/20052765>
- Williams RE, Mole SE. New nomenclature and classification scheme for the neuronal ceroid lipofuscinoses. *Neurology*. 2012 Jul 10;79(2):183-91. doi: 10.1212/WNL.0b013e31825f0547.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/22778232>

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